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ABSTRACT

Transparency theory is a view of learning and skill acquisition that grew out of the tradition in psychology that emphasizes the functional and holistic aspects of human perception and action. It emphasizes the tacit skill aspects of language acquisition and the functioning of language as a tool of social interaction as well as the more traditional language-learning concerned with explicit instruction in grammar and vocabulary. Interactive video is particularly well suited to this broader theory of second language acquisition. The interactive video approach taken at Brigham Young University's David O. McKay Institute has resulted in several kinds of projects: (1) the transfer to videodisk and annotation of existing tape footage, incorporating principles of transparency theory into the program design; (2) the adaptation of footage for various kinds of simulation; and (3) the creation of simulations. The results of these innovations have been encouraging. Some of the problems still to be solved include the costs of designing, developing, producing, and programming interactive video programs, misuse of the medium, limited vision caused by lack of experience with this rich technology, and language teacher defensiveness. Twenty-two references are provided. (MSE)

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A THEORY OF LEARNING AND SKILL-ACQUISITION APPLIED TO INTERACTIVE VIDEO: ACTIVITIES AT THE DAVID O. MCKAY INSTITUTE, BRIGHAM YOUNG UNIVERSITY

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In this chapter a broadened approach to learning theory will be described and illustrated through particular application to the problem of second language acquisition. This view of learning and skill acquisition grows out of more general tradition within psychology that emphasizes the functional and holistic aspects of human perception and action. An integration of these views is referred to by Brown, Warner and Williams (1985) as "transparency theory". This approach emphasizes the tacit skill aspects of language acquisition, and the functioning of language as a tool of social interaction, in addition to the more traditional language-learning concerned with explicit instruction in grammar and vocabulary. Interactive video is particularly well suited to this broader theory of second language acquisition. The interactive video approach taken at the David O. McKay Institute will be contrasted with ways in which language has typically been taught, and a brief report will be given of the interactive video programs that have been produced at the McKay Institute.

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DEVELOPMENTS IN INSTRUCTIONAL METHODS

Troubles with Traditional Approaches

Language instruction methods have, for the most part, grown from practical experience rather than being based upon a comprehensive theory, or even upon empirical research results. This has at least in part been due to the inadequacy of learning theory and learning research as it has developed in psychology over the past 40 years. The preoccupation of learning theorists with animal research and stimulus-response theories has produced a body of learning theory and research that is of little use to instructional practitioners.

The methods commonly used by language instructors have typically helped the student acquire language by dividing its complexity into tasks or segments and then feeding these somewhat isolated tasks to students in pieces. We will refer to this approach as "atomistic". The intent of such strategies is to make language learning more digestible, more chewable. The problem with such an approach is that it is very difficult to get a holistic or comprehensive view of the language. With this approach it is difficult for students to find meaning in entire phrases or paragraphs, or to use language effectively as a social tool.

Because in such strategies we typically emphasize reading and writing skills (the grammar and vocabulary), students are able to associate definitions with words, but frequently have difficulties when words, with which they are already familiar, are embedded in a larger context which may flavor or even change meaning. Language teaching approaches have also been somewhat controlled or limited by the technology available, which until recently has been primarily pencil, paper, and the printed page. It simply has been easier and more practical to teach language through a paper medium. All this has given students the impression that we are teaching definitions rather than meaning, grammar rather than the skills of speaking and understanding language.

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The Instructional Design Perspective

From the viewpoint of instructional designers who are encouraged to transfer the results of research into the teaching-learning process, acquiring a language requires a variety of different learning types, which in turn requires that different approaches be used for each learning type. In other words, a wide range of approaches should be used in teaching language, including satisfying conditions required for the teaching of: (1) defined concepts; (2) rules; (3) abstract concepts; (4) attitudinal change; and (5) problem solving (in the sense that Gagne used the term). Language use is clearly a multifaceted, complex skill which, because of its complexity, must be learned so completely that students can look past or through specific language tools. In fact, recent studies suggest that keeping language tools such as vocabulary definitions in the foreground can actually get in the way of language learning. Anecdotal data from a recent dissertation suggests that students understand the meaning of a phrase without knowing the specific definition for each word (Johnson 1985). Earlier studies seem to support this as well. Indeed there appears to be a genre of literature that suggests that meaning resides not in words or even in phrases, but in a holistic context (see, for example, Bransford et al. 1972a, 1972b, 1974; and Sachs 1967). If the meaning of a language is not found in words but in ourselves, in context and from our own personal experiences, then language can best be learned through experience, whether real or simulated. This perspective argues against the initial, heavy use of printed or written language; against the use of abstract, symbolic representations of real-world contexts.

The Power of the New Technology

The excitement of interactive video-disc technology is that it can readily provide simulated experience rapidly, and less expensively, than traveling to and living in a country where a specific language is spoken. Interactive video-disc technology (microcomputers mated to video-disc players) can provide context and contextual clues, while giving learners total control of the information flow (something that research suggests is very necessary). It can easily provide many different kinds of helps or supports such as dictionaries/glossaries, explanatory comments, feedback, etc., and can provide all of these instantaneously. Interactive video-disc technology can provide on-line, and under student control, virtually any piece of information within three to six seconds. The real power of such technology is that both visual and aural channels can be provided along with text which is either written on the screen or which students have to create. This makes it possible for writing and reading exercises, listening/viewing comprehension exercises and other such exercises which can, if the content is carefully designed, provide a holistic experience, while at the same time providing specific tools when needed.

The power of the technology is so complete in terms of past media that the old term of "listening comprehension" probably ought to be changed to "perceptual comprehension" when students are both viewing and listening to a video sequence. In fact, with text, graphics, aural, and visual information being provided through the medium we may want to label the student's experience "contextual comprehension" as students view, listen, read, and in other ways experience the language *and the culture* associated with the language.

With such a technology the learning process can be much more under learner control providing free access to many tools, aids, and experiences available through interactive video. The student of a second language can "explore" the language and its culture much as they would in an immersion experience living in Spain, Germany, or France.

These technological breakthroughs together with recent advances in second language acquisition research and theory go far beyond the learning theory that is currently available within that branch of psychology and cognitive science. What is needed is a firm theoretical undergirding for these holistic, skill-based approaches to language acquisition and to learning in general.

For many years now, learning theory and behaviorism have been synonymous, but learning theory is too important a topic to be left to any one school of thought. The behavioral school, the generative grammar structuralist school, and the information processing schools have all given us important insights into the nature of learning, but no one of them alone or even all three combined are adequate to the task of providing a theoretical foundation for an adequate and practically useful theory of learning. All three of them are wrong in fundamental ways in their account of human learning and the acquisition of knowledge. Kurt Lewin once said that there is nothing more practical than a good theory. *Perhaps the single most important thing that could be done to improve instruction in our nation's schools is to construct an adequate theory of human learning and skill acquisition.*

There have been some important developments in four very diverse areas that have promise for the development of such a theory: (1) J. J. Gibson's theory of perception (1966, 1979), which he refers to as "ecological optics"; (2) Michael Polanyi's (1962: chs. 4 and 5) account of the psychology of skills; (3) developments over the past 30 years in contemporary psychophysics (see, for example, Green and Swets 1966 and Sakitt 1972); (4) the important discoveries of linguists over the past 20 years with respect to how second languages are most effectively acquired (Lambert and Tucker 1972, Krashen 1981, Fillmore 1976). The insights of all four taken together provide a foundation for a social and "hermeneutic" psychology of learning with the search for meaning and one's place in the social world as the fundamental principles of human action rather than the artificial principles of the association of stimuli and responses. Brown, Warner, and Williams (1985) have articulated the revolutionary shift that these new directions could make in psychological theory. Their approach is termed "transparency theory". They show that many paradoxical findings in the attention theory literature, in social psychology and in observations from clinical practice that are usually explained in terms of psychodynamic theory can be much better understood from the holistic view of transparency theory.

Some of the major propositions and insights of transparency theory are given in the article "Transparency Theory and Second Language Acquisition" by Brown and Williams (1983). We will give here a brief summary of major points.

1. We will not have an adequate psychology of learning until we have an adequate understanding of the nature of skills. The fundamental orientation of the current "information processing" approach to cognition precludes an adequate account of the nature of skills.
2. The received view of "unconscious mental processes" or "processing without awareness" in contemporary cognitive psychology is closely parallel to the Freudian splitting of the psyche into the conscious and the unconscious components and fails on similar grounds.
3. Polanyi's concepts of *tacit* versus *explicit* knowledge, *focal* versus *subsidiary* knowledge, *objects* versus *instruments* of attention, and *the transparency of language* provide a much more productive theoretical basis for understanding the psychology of skills, the place of automaticity in the acquisition of knowledge, and the ways in which information outside of our explicit focus can alter our behavior than traditional cognitive psychology accounts in terms of "unconscious mental processes".
4. Every demonstration of unconscious mental processes or subliminal perception rests upon the assumption of atomism (single units of stimulus or response). When one gives up this assumption, there is no longer a need to posit two minds (conscious and unconscious) or parallel processors to account for the empirical observations, but they can be more simply understood in terms of the Gestalt principles of focal and subsidiary awareness.
5. Many empirical contradictions and theoretical paradoxes can be solved by considering perception to be tacit, holistic, and active. For example, the conflict in the attention theory area between Treisman's (1964) demonstration that one cannot identify even what language is being spoken in the unattended channel and Lewis's (1970) demonstration that there is "full semantic processing" of the unattended channel is not paradoxical in the least when considered in the context of Polanyi's concept of the

transparency of language (that one can focus "through" words as instruments of attention to their meaning, or the pattern which they jointly constitute).

6. Language is a skill and is best acquired as a tool in the service of some other endeavor. This is true in general of skills: one must focus through the parts to the whole performance for effective acquisition. The acquisition of skill in a computer language such as Fortran or Pascal is a good illustration of this. Many have tried to teach such languages in the traditional academic classroom manner. But apprenticeship and hands-on experience are much more effective. One must have a computer to tinker with to acquire the skill. In fact, one of the reasons that the most capable "hackers" are those who learned it as a kid is because kids are willing to tinker around for a long time. One could talk about "critical periods" here as Lenneberg and others have with respect to the acquisition of natural languages, but it really has much more to do with social expectations and habits. Many of the most effective strategies used by the effective programmer may be tacit, never having come up for explicit review. Perhaps the most effective strategy for acquiring skill in a computer language is to have an increasingly difficult series of meaningful "projects" on a computer, some that you are really committed to and interested in, and then a good reference book, and even a tutor for asking your most pressing questions. By the time you finish the projects you have a great deal of skill, much more than if the equivalent time were spent reading a book on Pascal, Fortran, Basic, etc. Skill in framing houses comes from actual building, not just nail driving "drills" and lectures, and a major part of computer language and natural language acquisition also has this tacit skill-development component.
7. Observations about language acquisition that theorists have explained in terms of physiological limits are much better understood in terms of social processes. Just as Lambert and his colleagues have shown that many of the language acquisition failures that have been attributed to lack of cognitive capacity are better understood in social psychological terms (resistance to a dominant culture, refusal to betray one's social group, hostility toward those who speak the target language, etc.), so Graham (1985) has demonstrated that the superiority of teenagers over adults in language acquisition is not due to some kind of physiological limit (because of solidified brain lateralization) or "critical period" as Lenneberg and many others have maintained. It is rather due to social factors, the unique peer group influence of the teenage years.

Arguments in Support

The paper by Brown, Warner, and Williams (1985) upon which many of these propositions from the Brown and Williams (1983) paper are based, in some ways seems grandiose. They are proposing that transparency theory could provide a unity and a stronger explanatory foundation for areas as diverse as cognitive theory, personality theory, clinical psychology, cognitive psychology, perception, psychophysics, attention theory, social psychology, and learning theory. But central to their argument is the proposition that all of these academic areas are really only different levels of analysis and different approaches to understanding human interactive functioning, with a great deal of historical accident and arbitrariness in the first place in the way the boundaries have been drawn, so that an adequate reconceptualization of any one of them will have reverberations throughout the rest. It should also be emphasized that this is certainly not a new tradition within psychology, but rather an attempt to recast themes from a number of traditional directions (such as the insights of the Gestalt psychologists and functionalists such as Joseph Peterson 1935), in the light of important empirical findings from contemporary work in many areas, especially language acquisition and perception.

Although there are many insights from the empirical work on language acquisition that have important implications for a theory of learning, that theory has yet to be articulated. In fact, some of the most serious deficiencies in the second language literature are because of precisely this, they do not as yet have a coherent and systematic theoretical account of the principles of learning. The transparency theory provides a kind of metatheoretical backdrop for the development of a broad theory of learning that is unified with other major areas of

psychology such as perception, attention, and social psychology. But much work remains to be done in the development of this approach to learning theory.

As we have argued above, the fundamental error of past approaches to learning theory has been "atomism": assuming that the perceptual world consists of single stimulus "atoms" of input and that human action consists of single "atoms" or response. The new information processing approach to cognition for the most part falls into the same deadly error of atomism that the behaviorists do, but in addition is guilty of positing all kinds of unobservable mental fictions that have the effect of cutting off inquiry. The units of perception and the units of action have been determined in these theories by stipulation, by a rationalistic theoretical decision, a legislative agreement among theorists (notwithstanding their lip service to empiricism). But this is the very thing that is at stake, the very thing we must empirically learn--*what are the most effective units of analysis*. And this question is not just applicable to theory building and language teaching, but it is the crucial question for the learner.

One of the most fundamental ways effective learning differs from ineffective is in the units of analysis used by the learner. There is some evidence, for example, that the best readers do worse at a letter-by-letter task, such as finding all of the "e"s in a passage of text. Fillmore's dissertation (1976) gives some very important information on the unit of analysis that is most effective in acquiring a second language. She has shown that children make use of a kind of verbal operant (phrases that function as a unit and can be used to bring about a desired state of affairs) in the natural-language-immersion acquisition process. She calls these "formulaic utterances", and she shows that they are first used as a whole, sometimes misused, and gradually analyzed into their component words as the child gains experience and sees common words in a number of them. In other words, rather than beginning with words and then learning to put them together into sentences, as one would do when explicitly learning a language, when children go through this immersion process of acquisition they begin with useful verbal operants, or "formulaic utterances" and learn the words as they analyze the parts of these pragmatic units through noticing similarities with parts of other formulaics. Well over half of the child's speech in the early months of acquiring the second language consists of formulaic utterances. Likewise, Graham and Brown (1985) have argued that the primary reason for the much greater ultimate success of teenage language learners than their parents is explainable in terms of the task focus of each. The parents for the most part approach language learning as an intellectual puzzle whereas the teenagers approach it as a social skill necessary for survival in their peer group. This difference of focus will have implications for the way in which each attends to language (units of analysis), and the most holistic and functional social focus is more effective.

What Learning Theory Ought to Incorporate

Although many of the arguments above have taken language acquisition as a "paradigm case", we are seeking to develop a much broader theory of learning based upon these principles with applications across the curriculum. From this "transparency theory" point of view the classroom is best considered holistically with particular emphasis on intentions, social needs, and social interactions. Climate and task focus are all important. Teaching is more than establishing mental associations, or even the transferring of cognitive principles, facts, theories, and concepts. It is most productively viewed as a complex social process, and until we consider it totally, with an emphasis on its meaning in human terms, we will fail. It is dialogue, worlds in collision, social exchange, and negotiation; it is often social tragedy, and sometimes it can be friendship and community, ideas, dreams, and vision. It is skill and apprenticeship, getting young people into the world of ideas at an early age. It is reading together and living the great ideas and the great books together which will enable students to enter into dialogue with the greatest minds, even though removed in time, space, and social level. It is a chance for teacher and student to mutually grow from a sharing of the unique perspective of each other in contact with the creations of the world's greatest minds. As Buber (1958) said, "we are molded by our pupils and built up by our works." The best education is mutually edifying for teacher and student, and they grow together. Nothing less than a total theory of learning that includes interpersonal dynamics and the search for meaning can have the kind of practical effects that are needed to transform our educational institutions.

In summary: (1) past learning theories have been too atomistic rather than holistic, (2) past theories have been mechanistic (focus on physiological mechanisms) rather than hermeneutic (focus on meaning), and (3) we have been looking for explanations in terms of mental structure and physiology when much simpler and much more adequate explanations can be made in terms of intentions, social structure, and task focus.

Although we have been arguing strongly in these last paragraphs for a humanistic approach to education in which the most essential elements are the teacher and the students in their totality as human beings, we see the great advances in pedagogical technology as also being central to this vision. The old concern that such advances could make teachers unnecessary is obviously mistaken. The value of such technology fades rapidly without implementation in human terms by a wise and capable teacher. The best technology is only useful when combined with a wisely engineered instructional setting that takes into the account the total person in the context of our finest intellectual traditions. In that way, interactive video is a great ally to the teacher who wants to open his student's eyes as well as his own to the world of ideas, languages, cultures, and traditions. When we learn to use it, the electronic revolution may be an intellectual development comparable to Gutenberg's revolution.

CURRENT ACTIVITIES AT THE DAVID O. MCKAY INSTITUTE

Now that we have described our theoretical orientation and how we see it forming a natural foundation for the development of video-disc instructional programs, we will briefly describe some of the projects that have been developed at the McKay Institute and some of the initial evaluations.

The Annotation of Existing Footage

Early in our experience with interactive video we secured permission to transfer a film called *Macario* to video disc, and developed an authoring template that permitted us to "annotate" that film. The Spanish instructors involved, James Taylor and Gloria Melendez, used the film in an intermediate Spanish class by having students look for the use of analogy, symbolism, and metaphor in the film. This exercise would help the students begin to notice subleties in meaning. They also pointed out cultural and linguistic aspects of the film that they felt were appropriate.

Until we pressed an annotated video disc, the instructors had been using the film in their classroom which required one class period to lecture on the film and two class periods to simply show it. With the annotated video-disc version they simply sent students to our labs to interact with the film and to notice those elements of the film that were important for their course objectives.

We conducted three studies comparing the students who used interactive video disc with those who saw the same film on video tape. The video-tape group received a lecture on what they were supposed to notice in the film; were told to go to the LRC in the Library and view the film as often as they liked and were later required to take an exam and write a paper based on the film. The video-disc group received no lecture but were simply sent to the video-disc lab to interact with the film and were also tested and required to produce a paper.

Our research results showed that the video-disc group outperformed the video-tape group in their ability to retain information and recall facts, with statistical significance exceeding the 0.01 level of confidence. Very importantly, the performance of the video-disc group was almost two full standard deviations above the video-tape group (S.D. difference =1.92), which means that the poorest performing video-disc students were equal to the best performing video-tape students in this comparison.

These results are encouraging as a vindication of our initial effort to incorporate principles from instructional research and learning theory into the design of the program. That is, *what* we wanted the students to notice was tied

directly and inseparably to the *explanation* of what we wanted them to notice, the students had complete control over the information flow, and a variety of helps or support was available all at the stroke of a key. We are encouraged by these results, as it is a comparatively simple and inexpensive process to annotate existing footage.

To the student the annotation template looks like this: the movie begins and runs continuously unless the student does something to stop it. A simple text promptly appears on the screen in Spanish which indicates that if the student touches the space bar the presentation will stop. When the student touches the space bar, which can occur at any time in the program, the computer immediately stops the disc player and inquires as to where it is. Based on that information the computer displays a screen full of text which consists of comments or questions. The student can select one of the comments or questions on the screen by pressing its number and immediately that comment or question will be repeated along with an answer or further commentary. The student can then explore all of the questions or comments for that section of that scene and gain information about cultural aspects, vocabulary, linguistic usage, use of symbolism in the film, etc.

Also displayed on the screen is a header or banner which contains prompts that give the student control over the information flow. The student can back up the presentation to repeat that scene, back it up "x" number of seconds, can continue the presentation, can call another set of text files in English, can call a dictionary, and in other ways get support and help.

This annotation approach has been used with existing discs such as *Klavier im Haus*, *Midway*, *Raiders of the Lost Ark*, *Waldo Pepper*, in order to teach elementary math, elementary level history, English as a second language, and other topics.

Making Existing Footage "Interactive"

We have also taken existing footage and used it in interactive ways other than simply annotating it. Annotating existing footage is a great way to begin to introduce a new topic, present vocabulary in context, etc., but it is a poor place to stop. For this reason we have used our simulation templates to adapt existing footage thereby providing different kinds of practice. We originally proposed to adapt existing footage for the Defense Language Institute and began that project by transferring segments of the BBC series *Kontakte* to disc for a demonstration project. Sections of *Kontakte* were then programmed consistent with the directions of a subject-matter expert, Randy Jones, to play sections of the disc and ask questions of the students afterwards. This provided students with the opportunity to notice vocabulary items, cultural cues, etc. As students used this footage they were exposed to different situations and circumstances in Germany where German was being spoken and then were asked questions about what they heard and understood. Based on their response, the disc would then branch to pieces of the segment they had seen and replay it for them. The computer also provided the script in German, English translations, a glossary of terms, and other helps. We believe that this approach to language learning has a great deal of potential and is comparatively inexpensive as no production costs are incurred. Only the license fee to transfer and use the existing footage need be paid.

We are currently using this approach as we transfer the *Digame* series to video disc for use in the secondary schools. Karl Barksdale and Steve Neilsen of the Provo School District are working with us as we adapt the *Digame* series for use in their Spanish classes. One of the most impressive things about this approach is the interest and motivation of students, as well as their apparent ability to notice, understand, and retain the meaning of phrases and sentences. We will begin researching the use of this series in the fall of 1985.

The Creation of Simulations: *Montevidisco*

One of our early productions, *Montevidisco*, was conceptualized over six years ago by Edward Schneider and Junius Bennion as a conversational simulator. This interactive video program simulates a visit to a Mexican village and requires the student to be the main protagonist in the story. The student encounters tour guides, hotel clerks, sales people in the market place, and many others in his visit to Mexico and must respond to many questions and situations presented to him in context. Depending on the student's response to the situations, he can have a great time visiting Montevidisco or may find himself in the hospital or police station. This adventure game element in *Montevidisco* is intended to motivate and we are hoping that students will, as different consequences befall them, wonder, "What would have happened if I had selected this instead of that option?" and will want to go back into *Montevidisco* to find out. It is our intention that students wanting to play the game will explore the town rather completely and in the process be exposed to a great deal of native Spanish.

To the student *Montevidisco* looks like this: the student confronts a tour guide on the screen who speaks to him and asks if he isn't from the United States, at which point the screen freezes and awaits a response. The options available to the student are listed on the screen and the student, upon selecting one, is prompted to speak that response. (As he speaks, his response is recorded for the teacher or the proctor to evaluate.) Based on the student response, the tour guide then has one of four possible answers which will direct the student to the bus stop, suggest that he go to a bar, send him to a drugstore to help take care of his headache, or the guide will try to sell him tickets to a bullfight. Each of these branches has three to four possible consequences and each of those 16 branches has three or four different branches as well. As you can imagine, the student could spend many hours exploring *Montevidisco* and never see all of the branches.

Flight 505

We have recently completed a co-production with the BBC called *Flight 505* where many of the features of *Montevidisco* were used. In this interactive video program a Japanese businessman is visiting the United States. During his stay in the United States, the Japanese businessman experiences: immigration and customs, a female executive who outranks him, a hotel clerk, a boisterous and embarrassingly outspoken Texan, executives from other companies who invite him to golf and to fast-food stores and to a fancy restaurant for dinner, and so forth. The helps available to the student learning English as a foreign language include the fact that they can back up and repeat a scene, have instantaneous feedback with a surrogate or model who appears on the screen (to say the response the way it should have been said *after* the student has tried his hand at it); a dictionary or glossary which keeps track of which words occurred in a scene and presents them along with their definitions if so desired, and an explanation file, which in this case is in Nehongo.

The Technology in Relation to the Theory

We are encouraged from our limited initial experience with video-disc technology. Such a simple and inexpensive procedure as annotating existing footage has been shown to drastically increase the student's ability to notice important content and retain it. We have also been able to simulate social situations with the video disc in which the student can, in an environment under his or her own control, practice using the language as an interactive tool, but with the added advantage of seeing the written form of the verbal interactions, and with an immediate dictionary. Video disc does seem to offer great possibilities as a way of engaging the student in a "near immersion" kind of language experience, consistent with our theory of second language acquisition. It is possible to set up situations that come very close to the social use of language in which "verbal operants" are required of the student in order to achieve social, interactional ends.

CONTEMPORARY PROBLEMS AND FUTURE DEVELOPMENTS

Some of the problems we view in the future in the use of interactive video are the (1) costs of designing, developing, producing and programming interactive video programs for language instruction; (2) misuse of the medium; (3) limited vision of most of us; and (4) defensiveness on the part of many language instructors.

Regarding the costs of developing interactive video, we are convinced there are ways that these costs can be substantially reduced. We have researched such means and have developed prototype tools which appear to function very efficiently. However, the details of such cost-saving tools will need to be described in another article.

Frequently the medium is misused. Where some language instructors have begun to use the technology of interactive video disc, they have typically "driven" the student, not providing tools or helps to the student, purposely making it impossible for the student to explore the language. This use of the medium is counter to learning research results and unnecessarily restricts the potential of interactive video making the resulting lessons unproductively anemic and primarily limited to drill, drill, and drill. While different kinds of drills may be very useful in language learning, they are not the only way, nor are they the best way, to use interactive video. Such a use of the technology is roughly comparable to someone playing the piano by incessantly pounding on two or three keys when a rich, harmonious fabric is available, useful and enjoyable.

Another problem seems to be the limited vision of most of us in language learning because of our lack of experience with such a rich technology. We fail to dream dreams that are now possible.

The final, most pervasive, most difficult, and most unnecessary problem is the defensiveness of many language instructors. They feel and argue that the machine will replace them; that there will no longer be a need for language instructors. While such arguments were used early (over 20 years ago) by those who were trying to justify costly computer-assisted instruction (CAI), such positions are untenable today. In the first place, the technology is much less expensive than the old CAI and there is real promise for substantial cost reductions and benefits growing out of its use with, and under the direction of, an instructor. Secondarily, language acquisition is such a complex task that it would be impossible to accomplish through a machine by itself. The wisdom of the instructor in designing instructional sequences and organizing a total plan is crucial to the success of the technology.

The biggest weakness of interactive video-disc technology is the fact that it cannot evaluate student's productions. Rather than worry about losing our jobs, we ought to be projecting how our roles can change and become more professional with the introduction of higher technologies. As in no other time, the role of teachers of language and teachers in general can be made more professional because of the availability of these newer technologies. We see interactive video as being a very useful tool in providing students with specific definitions, information regarding the culture, simulated conversations, etc., and doing so tirelessly and positively. This is something that is very difficult for a human to do, especially with large groups of students.

Teachers can diagnose and prescribe for students what they ought to be doing to improve their language skills. The instructor is really the only evaluator capable of judging the student's production in terms of accuracy, intonation, emphasis, meaning, and appropriateness in context. The technology cannot compete with teachers in this role. Professional language instructors who use interactive video in concert with other instructional approaches can look forward to changing their role to that of a professional diagnostician and prescriber, a motivator, and an evaluator. As director of the total learning environment, the language teacher must have a knowledge of the total process of learning and must be responsible for the ways in which specific technological tools integrate into an overall plan. Such a role closely parallels the professional role of a physician who relies on technology and assistants to provide a majority of the treatment.

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